

WHAT IS CLAIMED IS:

1. A current driving device provided on a semiconductor chip, comprising:

a first-conductive-type first MISFET to which from a reference current source for making a reference current flow, the reference current is transmitted;

5 a first-conductive-type current distribution MISFET which constitutes a current mirror circuit together with the first MISFET and makes the reference current flow;

a second-conductive-type current input MISFET connected to the current distribution MISFET;

a plurality of current supply sections each including second-conductive-type
10 current source MISFETs constituting a current mirror circuit together with the current input MISFET and an output terminal for outputting a current in accordance with display data;

a second-conductive-type current transmission MISFET constituting a current mirror circuit together with the current source MISFETs and the current input MISFET;

15 and

a reference current output terminal which is provided on a region of the semiconductor chip located at a distance of 200 μm or less from the current transmission MISFET and outputs a current transmitted from the current transmission MISFET.

20 2. The current driving device of claim 1,

wherein the reference current output terminal is provided on a region of the semiconductor chip located at a distance of 100 μm or less from the current transmission MISFET.

25 3. The current driving device of claim 1,

wherein the reference current source is located outside of the semiconductor chip,
and

wherein a first reference current input terminal which is connected to the reference
current source and transmits a current to the current input MISFET is further provided on a
5 region of the semiconductor chip located at a distance of 200 μm or less.

4. The current driving device of claim 3,

wherein the reference current input terminal is provided on a region of the
semiconductor chip located at a distance of 100 μm or less from the current input MISFET.

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5. The current driving device of claim 1,

wherein a current mirror circuit including a first-conductive-type MISFET is
further provided on a transmission path through which the reference current is transmitted
from the current transmission MISFET to the reference current output terminal.

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6. The current driving device of claim 5,

wherein a current mirror circuit including a second-conductive-type MISFET is
further provided on a transmission path through which the reference current is transmitted
from the reference current source to the first MISFET.

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7. The current driving device of claim 1, further comprising:

a first reference current input terminal connected to a drain of the first MISFET and
provided on a region of the semiconductor chip located at a distance of 200 μm or less

25 from the current input MISFET;

an input side current mirror circuit connected to the drain of the first MISFET and including a second-conductive-type MISFET;

a second reference current input terminal connected to the input side current mirror circuit and provided on a region of the semiconductor chip located at a distance of 200 μm or less from the current input MISFET; and

an output side current mirror circuit provided on a current transmission path from the current transmission MISFET to the reference current output terminal and including a first-conductive-type MISFET.

10 8. The current driving device of claim 1,
wherein a plurality of units of the current distribution MISFET and the current input MISFET are provided for the semiconductor chip.

9. The current driving device of claim 8, further comprising between each of the
15 current distribution MISFETs and each of the current input MISFETs, connection changing means for changing a connection so that each of the current distribution MISFETs is connected to a different one of current input MISFETs in every predetermined period.

10. The current driving device of claim 1,
20 wherein on the semiconductor chip, a plurality of MISFET regions each collectively including the current source MISFETs are arranged in a row, and
wherein each of the plurality of current supply sections includes MISFETs arranged in at least two of the plurality of MISFET regions.

25 11. The current driving device of claim 8,

wherein respective gate electrodes of the current distribution MISFETs are connected to a bias line so as to share the bias line with one another, and

wherein a resistance element is further provided on the bias line and between gate respective electrodes of adjacent ones of the current distribution MISFETs.

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12. A current driving device comprising:

a first-conductive-type first MISFET in which a reference current flows in a driving state;

a first-conductive-type first current distribution MISFET which constitutes a
10 current mirror circuit together with the first MISFET and makes the reference current flow;

a second-conductive-type first current input MISFET having a drain connected to the first current distribution MISFET; and

a plurality of current supply sections each including second-conductive-type current source MISFETs constituting a current mirror circuit together with the first current
15 input MISFET, switches which are connected to the current source MISFETs and turn ON or OFF a current flowing in the current source MISFETs in accordance with display data, and an output terminal which is connected to the switches and outputs a current in accordance with the display data to a display panel,

the current driving device being provided on a semiconductor chip,

20 wherein a plurality of units of the first current distribution MISFET and the first current input MISFET are provided for the semiconductor chip, and

wherein a bias line connected to a gate electrode of the first MISFET and gate electrodes of the first current distribution MISFETs and shared by the gate electrodes is further provided.

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13. The current driving device of claim 12,
wherein all of respective gate electrodes of the current source MISFETs in the plurality of current supply sections and a gate electrode of the first current input MISFET are connected to one another.

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14. The current driving device of claim 12,
wherein each of the plurality of current supply sections includes a second-conductive-type first cascode MISFET which is provided between each of the switches and the output terminal and is turned ON when a voltage equal to or lower than a power supply
10 voltage of the display panel is applied to a gate electrode in a driving state.

15. The current driving device of claim 12,
wherein each of the switches is a second cascode MISFET which forms a cascode connection together with the current source MISFETs and is controlled to be turned ON or
15 OFF depending on whether or not a predetermined voltage is applied to a gate electrode in a driving state.

16. The current driving device of claim 12, further comprising:
a first-conductive-type second MISFET which is connected to the first MISFET
20 and in which the reference current flows in a driving state, and
a first-conductive-type second current distribution MISFET provided between each of the first current distribution MISFETs and each of the first current input MISFETs and having a gate electrode connected to a gate electrode of the second MISFET.

25 17. The current driving device of claim 12, further comprising between each of the

first current distribution MISFETs and each of the first current input MISFETs, connection changing means for changing a connection so that each of the first current distribution MISFETs is connected to a different one of the current input MISFETs in every arbitrary period.

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18. The current driving device of claim 17,

wherein the connection changing means includes a first bias current switch and a second bias current switch.

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19. The current driving device of claim 17, further comprising:

a first-conductive-type dummy current distribution MISFET constituting a current mirror circuit together with the first MISFET and the first current distribution MISFET; and

a dummy connection changing means for temporarily connecting the dummy
15 current distribution MISFET and the current input MISFET.

20. The current driving device of claim 18,

wherein on the semiconductor chip, further provided are

a first terminal temporarily connected to the first bias current changing switch in a
20 driving state and

a second terminal temporarily connected to the second bias current changing switch in a driving state.

21. The current driving device of claim 12,

25 wherein on the semiconductor chip, a plurality of MISFET regions each

collectively including the current source MISFETs are arranged in a row, and

wherein each of the plurality of current supply sections includes MISFETs arranged in at least two of the MISFET regions.

5 22. The current driving device of claim 12, further comprising
a resistance element provided on the bias line and between respective gate electrodes of adjacent ones of the current distribution MISFETs.

23. The current driving device of claim 12, further comprising:
10 a plurality of first-conductive-type third current distribution MISFETs for transmitting the reference current in a driving state;
a plurality of second-conductive-type second current input MISFETs each having a gate electrode connected to an associated one of respective gate electrodes of the plurality of third current distribution MISFETs and a drain connected to an associated one of
15 respective drains of the plurality of third current distribution MISFETs; and
a second-conductive-type third cascode MISFET which constitutes a current mirror circuit together with the second current input MISFETs and is provided between the current source MISFETs and one of the switches.

20 24. A current driving device comprising:
a first-conductive-type first current input MISFET in which a first reference current flows in a driving state;
a first-conductive-type second current input MISFET in which a second reference current flows in a driving state; and
25 a plurality of current supply sections each including first-conductive-type current

source MISFETs constituting a current mirror circuit together with the first current input MISFET, switches which are connected to the current source MISFETs and turn ON or OFF a current flowing in the current source MISFETs in accordance with display data, a first-conductive-type cascode MISFET which is provided between the current source MISFETs and one of the switches and constitutes a current mirror circuit together with the second current input MISFET, and an output terminal which is connected to the switches and outputs a current in accordance with the display data,
the current driving device being provided on a semiconductor chip.

25. The current driving device of claim 24,
wherein on the semiconductor chip, further provided are
a first reference current input terminal for receiving the first reference current,
a first reference current output terminal for outputting the first reference current,
a second reference current input terminal for receiving the second reference current,
and
a second reference current output terminal for outputting the second reference current, and
wherein the first reference current input terminal and the first reference current output terminal are provided in parts of the semiconductor chip, respectively, so that the plurality of current supply sections are interposed between the first reference current input terminal and the first reference current output terminal.

26. A current driving device provided on a semiconductor chip, the device comprising:
a first reference current input terminal for receiving a first reference current;

a first-conductive-type first current input MISFET to which a current flowing in the first reference current input terminal is transmitted in a first period;

a plurality of current supply sections each including first-conductive-type current source MISFETs constituting a current mirror circuit together with the first current input MISFET in the first period and an output terminal for outputting a current in accordance with display data;

a first-conductive-type first current transmission MISFET constituting a current mirror circuit together with the first current input MISFET and the current source MISFETs in the first period;

10 a first reference current output terminal to which a current flowing in the first current transmission MISFET is transmitted in the first period;

a second reference current input terminal for receiving a second reference current;

a first-conductive-type second current input MISFET to which a current flowing in the second reference current input terminal is transmitted in a second period and which constitutes a current mirror circuit together with the current source MISFETs;

a first-conductive-type second current transmission MISFET constituting a current mirror circuit together with the current source MISFETs in the second period;

a second reference current output terminal to which a current flowing in the second current transmission MISFET is transmitted in the second period;

20 a first switch provided on a current transmission path between the first reference current input terminal and the first current input MISFET;

a second switch provided on a current transmission path between the first current transmission MISFET and the first reference current output terminal;

a third switch provided on a current transmission path between the second reference current input terminal and the second current input MISFET; and

a fourth switch provided on a current transmission path between the second current transmission MISFET and the second reference current output terminal.

27. The current driving device of claim 26,

5 wherein the current transmission path between the first reference current input terminal and the first current input MISFET and the current transmission path between the second current transmission MISFET and the second reference current output terminal share a first shared interconnect,

wherein the current transmission path between the second reference current input
10 terminal and the second current input MISFET and the current transmission path between the first current transmission MISFET and the first reference current output terminal share a second shared interconnect,

wherein the current driving device further includes, on the first shared interconnect, a first reference current switch for turning ON an output current of the first current input
15 MISFET in the first period and turning ON an output current of the second current output MISFET in the second period, and

wherein the current driving device further includes, on the second shared interconnect, a second reference current switch for turning ON an output current of the first current output MISFET in the first period and turning ON an output current of the second
20 current input MISFET in the second period.

28. A display device comprising:

a display panel in which a pixel circuit including a light emitting element having a luminance variable in accordance with the amount of a supplied current is provided; and

25 a current driving device which is provided on each of a plurality of semiconductor

chips arranged in a row and supplies a driving current to the pixel circuit,

wherein each of the plurality of the semiconductor chips includes a reference current input terminal for receiving a reference current in an end portion and a reference current output terminal for outputting a reference current for a semiconductor chip in a subsequent stage in another end portion, and

wherein the reference current input terminal and the reference current output terminal located in adjacent ones of the plurality of the semiconductor chips, respectively, are provided so as to face each other.

29. A display panel comprising:

a display panel in which a pixel circuit including a light emitting element having a luminance variable in accordance with the amount of a supplied current is provided; and

a plurality of semiconductor chips each including a current driving device for supplying a driving current to the pixel circuit,

wherein the current driving device includes

a first-conductive-type first MISFET in which a reference current flows in a driving state,

a plurality of first-conductive-type current distribution MISFETs which constitutes a current mirror circuit together with the first MISFET and makes the reference current flow,

a plurality of second-conductive-type current input MISFETs each having a drain connected to each of the plurality of the current distribution MISFETs, and

a plurality of current supply sections each including second-conductive-type current source MISFETs constituting a current mirror circuit together with the current input MISFET and an output terminal for outputting to the pixel circuit a driving current in

accordance with the display data.

30. A display device comprising:

a display panel in which a pixel circuit including a light emitting element having a
5 luminance variable in accordance with the amount of a supplied current is provided; and

a plurality of semiconductor chips each including a current driving device for
supplying a driving current to the pixel circuit,

wherein the current driving device includes

a first-conductive-type first current input MISFET in which a first reference current
10 flows in a driving state,

a first-conductive-type second current input MISFET in which a second reference
current flows in a driving state, and

a plurality of current supply sections each including first-conductive-type current
source MISFETs constituting a current mirror circuit together with the first current input
15 MISFET, switches which are connected to the current source MISFETs and turn ON or
OFF a current flowing in the current source MISFETs in accordance with display data, a
first-conductive-type cascode MISFET which is provided between the current source
MISFETs and the switches and constitutes a current mirror circuit together with the second
current input MISFET, and an output terminal which is connected to the switches and
20 outputs to the pixel circuit a driving current in accordance with the display data.

31. The display device of claim 30,

wherein in an end portion of each of the plurality of semiconductor chips, further
provided are

25 a first reference current input terminal for receiving the first reference current,

a first reference current output terminal for outputting the first reference current,
a second reference current input terminal for receiving the second reference current,
and

a second reference current output terminal for outputting the second reference
5 current,

wherein the first reference current output terminal is connected to the first current
input terminal of an adjacent semiconductor chip, and

wherein the second reference current terminal is connected to the second reference
current input terminal of the adjacent semiconductor chip.

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